HUMAN-MACHINE COMMUNICATION

Human-Machine Communication
Volume 5, 2022
https://doi.org/10.30658/hmc.5.3

Do People Perceive Alexa as Gendered? A Cross-Cultural Study of People's Perceptions, Expectations, and Desires of Alexa

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Abstract

Mainly, the scholarly debate on Alexa has focused on sexist/anti-woman gender representations in the everyday life of many families, on a cluster of themes such as privacy, insecurity, and trust, and on the world of education and health. This paper takes another stance and explores via online survey methodology how university student respondents in two countries (the United States, $n = 333$; and Italy, $n = 322$) perceive Alexa's image and gender, what they expect from this voice-based assistant, and how they would like Alexa to be. Results of a free association exercise showed that Alexa's image was scarcely embodied or explicitly gendered. Rather, Alexa was associated with a distinct category of being—the VBA, virtual assistant, or digital helper—with which one talks, and which possesses praiseworthy technical and social traits. Expectations of Alexa and desires regarding Alexa's ideal performance are presented and compared across the two country samples.

Keywords: Alexa, voice-based assistant, social representations of Alexa, cross-cultural comparison, expectations, desires

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ISSN 2638-602X (print)/ISSN 2638-6038 (online)
www.hmcjournal.com

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Introduction

The scholarship on Alexa[1] has mainly developed in six areas: sexist representation of women in the everyday life of many families (e.g., Lingel & Crawford, 2020; Woods, 2018); the practices of Alexa's use (e.g., Kurz et al., 2021); a cluster of themes such as privacy, insecurity, trust, and digital information (e.g., Bhatt, 2019; Natale & Cooke, 2020; Neville, 2020; Tristan et al., 2020); the world of education (e.g., Festerling & Siraj, 2020); the sphere of health (e.g., Anthes, 2020); and the industrial sector (e.g., Maio & Giudici, 2020; Yoffie et al., 2018). The discourses that have emerged are stimulating, but need to be accompanied by more empirical attention to the user experience. In this paper, we aim to advance this debate by exploring how people perceive Alexa, what they expect from this voice-based assistant (VBA), and what they would like to talk about with Alexa. In line with our aims, we chose to collect data from respondents in their own words by employing a free association exercise and posing a series of open-ended questions on an online survey.

Three sets of studies have informed our exploration: the first is the large set of studies on social representations, the conceptual framework within which we explored Alexa's image; the second is the collection of works on expectations toward robots; and the third is the range of studies on desires toward robotic technologies. We conducted our research in two different countries: the US and Italy, because we were interested in comparing how the same technological artifact is perceived and conceptualized in two countries characterized by a different degree of familiarization with advanced technologies. The United States is the country where internet use first developed and spread widely amongst its population whereas Italy is a European country where the use of the mobile phone has denoted a remarkable diffusion and use. These two countries are also characterized by a different degree of the ethnic composition of their populations and by a different attitude toward gender complexity, currently more pronounced in the United States than in Italy. Comparative research presents specific challenges but also value, in terms of knowledge, in producing comparable data (Livingstone, 2012). Operationally, we conducted an online survey using the same questionnaire with a convenience sample of US American (N = 333) and Italian students (N = 322). The structure of the paper is as follows: the next section is dedicated to summarizing the scholarly debate related to the topics discussed in this study and showing the gaps that we aim to fill with our contribution. Then, we present the methodology, followed by a report of the main results of the study, and finally the discussion of the results and concluding remarks.

The Debate on Alexa

The first set of studies supporting our exploration of Alexa's image is in part theoretical and in part empirical. Although most of the scholarly conversation about Alexa has focused on anti-women aspects in the everyday life of many families (e.g., Lingel & Crawford, 2020; Woods, 2018), on a cluster of themes such as privacy, insecurity, trust (e.g., Neville, 2020) and digital information (e.g., Natale & Cooke, 2020), and on the world of education and

1. Throughout the manuscript, we refer to Alexa by name and avoid the use of gender pronouns for three reasons: (1) Amazon avoids gender pronouns in communications about Alexa in corporate dealings; (2) Alexa is programmed to respond to questions about gender by saying "I'm not a woman or a man, I'm an AI"; and (3) to respect the diversity in our respondents' gendered and genderless conceptualizations of Alexa.

health (e.g., Anthes, 2020), we opted to explore the first impressions, gendering practices, expectations, and desires that respondents brought to their experiences with Alexa. We drew upon Moscovici's (1961) theory of social representations, the conceptual framework which is mainly constituted by a psycho-sociological theory of knowledge (Jodelet, 2011) and which aims to identify and interpret the processes by which people come to a shared understanding of the social world (Abric & Tafani, 2009). On the empirical front, we relied on two previous studies that have also used this framework, one on the image of four robots (InMoov, Padbot, Joy Robot, and Turtlebot; Fortunati et al., 2021) and the other on the image of the robot Sophia (Fortunati, Manganelli, et al., 2022). In both cases, their results showed that respondents developed disembodied images of the robots under investigation. Moreover, results from the second study demonstrated that despite Sophia's feminine appearance, the robot's gender was not salient to respondents' perception, in the sense that only one respondent explicitly invoked gender through the use of the word gynoid. This leads us to our first research question.

> **RQ1**: How do respondents (US and Italian) perceive Alexa in terms of embodiment and gender?

People also bring to their interactions with communication technologies a set of expectations that project a baseline for evaluating subsequent experiences and thus serve as perceptual filters on reality. From a socio-psychological point of view, expectations are beliefs regarding a current or future situation, based on a probabilistic approach and direct or indirect experience. Their fundamental function is to guide behavior (Roese & Sherman, 2007) and, as such, they are one of the basic constructs of the human mind. In the case of robots, most people are limited at present to indirect experiences of the object considered. For example, two longitudinal surveys of European citizens aged 15 and over—one in 27 EU member states in 2015 (n = 26,751) and the other in 28 member states in 2017 (n = 27,901)—documented that the percentage of European citizens who had a direct experience with robots was small (12.5% and 13.1%, respectively) (Eurobarometer, 2015, 2017). In the last 5 years, the percentage with direct experience has probably increased with the diffusion of robotic products like VBAs. Yet, knowledge about robots continues to come mainly from entertainment (movies, cartoons, TV series, comic books, advertisements) and the world of information, where fictional cultural objects intersect with journalistic news (e.g., Humphry & Chesher, 2021) and where marketing descriptions often oversell the functionality of new technologies (Paepcke & Takayama, 2010). As Rósen (2021) stressed, the resulting expectations toward actual robots might be inflated in an unrealistic manner. Thus, the expectations adults (Manzi et al., 2021) and children (Alves-Oliveira et al., 2014) hold for robots are based on fancy cultural objects and on indirect experience, which may undermine their ability to accurately forecast experiences with real, commercially-available robots. A survey questionnaire of 704 Italian children in primary and secondary schools showed that the gap between the advanced human-like features of fictional robots and those attainable in actual robots which are still at the level of prototype leads to confusion for children between the factual and fictional in current robot design (Fortunati et al., 2015).

Framing people's expectations in human-machine communication (HMC) means analyzing how people cope with what Kwon et al. (2016) called the "experience gap," or the distance between prior information and expectations held for robots and their actual

performances (Rosén, 2021). As this distance widens, users may experience increasing levels of disappointment, mistrust, and rejection (Paepcke & Takayama, 2010). On the other hand, robots may occasionally surpass user expectations, invoking pleasant surprise rather than disappointment (Abendschein et al., 2022). Preconceived expectations, however, can be overridden by robots' behavior (Horstmann & Kramer, 2020) and interactions with real robots (A. P. Edwards et al., 2019). Studying this gap allows us to understand not only the frames that are built around robots as cultural objects (Fortunati et al., 2018) but also respondents' suggestions for improved use and design. These frames are heavily influenced by hyperbolic advertising messages, industry attempts to evoke fascination and awe, and the narrative registers of robots in films, TV, comics, and video games, many of which stand in contrast to the relative immaturity of current actual robots. Studying this gap also allows us to map people's grievances on the current functioning of these artifacts and thus provide the companies which produce them with clear indications of people's general sentiments, expectations, and desires.

The literature on expectations toward robots includes experiments (e.g., C. Edwards et al., 2016; A. P. Edwards et al., 2019; Horstmann & Kramer, 2020; Spence et al., 2014), cross-cultural surveys (e.g., Bartneck et al., 2007), and other methods like latent profile analysis (e.g., Manzi et. al., 2021) and the use of stories of robots (and humans) acting in hypothetical scenarios to explore robots' moral attitudes (Wasielewska, 2021). In this framework, Alexa represents a peculiar case, because this and other VBAs have become mass commodities. Strengers and Kennedy (2020) reported that Siri reached 150 million users in the first year and Leskin (2018) documented that 600 million people regularly use virtual assistants worldwide. As a mass commodity, Alexa offers the opportunity to investigate the question of expectations in the context of real daily experiences and practices of use. Therefore, we pose our second research question.

RQ2: What expectations do respondents (US and Italian) have of Alexa?

The third body of literature we engage in this project concerns users' desires of robots, or how people would like robots to be. There is a wide debate within technology studies on why users matter (MacKenzie & Wajcman, 1985; Oudshoorn & Pinch, 2003). However, the operationalization of these theoretical approaches has not always been carried out meaningfully. Proof of this is the widespread Technology Acceptance Model (TAM) which limits itself to frame the problem solely in terms of users' acceptance of the technological artifact (e.g., Venkatesh & Davis, 2000). But it suffices to also look at the history of information and communication technologies as well as telecom, mobile, and internet companies in the last 3 decades to understand the continuous activity, on the part of users, of bottom-up creation of the technological artifacts we use every day. For this reason, one goal of this study was to capture not only what people like and/or dislike about Alexa, but also what they would, if possible, like to talk with Alexa about. Therefore, we asked the following research question:

RQ3: What would respondents (US and Italian) ideally like to talk with Alexa about?

Finally, regarding perceptions, expectations, and desires of Alexa, we also examined differences by user country (as reflected in the RQs) and user gender. Both of these variables have been studied previously in human-robot interaction; while the influence of country has clearly emerged as significant (e.g., Bartneck et al., 2007), the influence of gender has

produced conflicting results. Some studies, for example, have found that men's attitudes toward robots are more positive than women's (e.g., Showkat & Grimm, 2018), while other studies (e.g., Reich-Stiebert & Eyssel, 2017) have not found significant gender differences.

Methods

Participants and Procedures

In 2021, following Institutional Review Board approval, we administered an online survey[2] about Alexa at a large, public, Midwestern research university in the United States and a medium, public, Northeastern university in Italy. Following the informed consent process, in the US, student respondents were recruited from several large undergraduate courses in communication, which serve as requirements or electives for a variety of academic majors. In Italy, we asked the students of an undergraduate and a graduate course on multimedia science and technology to fill out the questionnaire. Overall, we collected 333 questionnaires in the United States and 322 in Italy. The description of the two convenience samples is provided in Table 1.

TABLE 1 Social and Demographic Characteristics of Respondents

Variable	US	Italy	Total
	N (%)	N (%)	N (%)
Gender			
Female	209 (62.8)	175 (54.3)	384 (58.6)
Male	107 (32.1)	147 (45.7)	254 (38.8)
Nonbinary	7 (2.1)	–	7 (1.1)
I prefer to self-describe	3 (0.9)	–	3 (0.9)
I prefer to not answer	4 (1.2)	–	4 (1.2)
Missing	3 (0.9)	–	3 (0.9)
Total	333 (100.0)	322 (100.0)	655 (100.0)
Education			
High School or Graduate	260 (78.1)	251 (78.0)	511 (78.0)
Equivalency Degree (GED)			
Bachelor	34 (10.2)	49 (15.2)	83 (12.7)
University Degree or Higher	1 (0.3)	22 (6.8)	23 (3.5)
I prefer to self-describe	29 (8.8)	–	29 (4.4)
I prefer to not answer	7 (2.1)	–	7 (1.1)
Missing	2 (0.6)	–	2 (0.6)
Total	**333 (100.0)**	**322 (100.0)**	**655 (100.0)**

2. Data used for the current project is drawn from a larger collection which included questions about a range of user orientations toward Alexa (A. Edwards et al., 2022; Fortunati, Edwards, et al., 2022). A copy of the full survey is available from the corresponding author on request.

Of the sample, 36.8% reported personal ownership of at least one Alexa device, with 37.8% of those owners having more than one. Among those who did not own Alexa (n = 414), the majority 63.2% may be described (on the basis of the open-ended answers of this questionnaire) as proxy users who observed and interacted with the Alexa of their partners, friends, parents, and so on. There was no significant difference in Alexa ownership according to respondent gender within the US sample ($\chi_1^2 = 2.36$, *ns*) or the Italian sample ($\chi_1^2 = 0.12$, *ns)*. However, on the basis of nationality, a larger proportion of US versus Italian respondents owned Alexa (47.7% vs. 25.2%; $\chi_1^2 = 34.95$, $p < .0001$, Std. Res = 5.9) and US respondents were more likely to own more than one (44.9% vs. 24.4%; $\chi_1^2 = 9.59$, $p < .003$, Std. Res = 3.1). Thirty-seven percent (n = 241) of respondents reported using other virtual assistants, and this was significantly more common among the US than Italian respondents (44.8% vs. 28.9%; $\chi_1^2 = 17.83$, $p < .0001$, Std. Res = 4.2). Regarding gender, there were no differences between men and women for the US sample ($\chi_1^2 = 2.59$, *ns),* but in the Italian sample, men were significantly more likely than women to use other VBAs ($\chi_1^2 = 8.12$, $p = < .005$). The other VBAs cited by respondents included Siri, followed by Google Home, Google Assistant, Cortana, and then Bixbi.

We asked respondents a series of questions related mainly to the three areas of their perceptions, expectations, and desires of Alexa. Regarding the first area, perceptions of Alexa (RQ1), we employed a free association exercise. Respondents were instructed to "Please write the first three words that come to your mind when thinking about Alexa." We decided to use this method because it enables us to capture the spontaneous emergence of words elicited by the cue assigned. Traditionally, this technique is designed to illuminate the consensual meaning (i.e., the most frequent words and rankings) regarding a social object (Abric & Tafani, 2009; Moscovici, 1984; Wagner et al., 1999). The free association method, through its projective character, offers the advantage of bringing out the latent and implicit dimensions of the knowledge and opinions on a specific object (Bellelli, 1990), giving access to the figurative core of its social representations (Moscovici, 1961). As File et al. (2019) argued, this technique differs from questionnaires with predefined response options (Bansak et al., 2016) because it allows respondents to freely express their opinions in their own words; further, this technique offers the advantage of fast data processing, as opposed to several web-mining methods (Lazer et al., 2014).

We also explored respondents' expectations of Alexa (RQ2), asking the open-ended question: "What do you expect/would you expect from Alexa in terms of being able to fulfill your requests?" and we investigated their desires of Alexa (RQ3) with three yes/no questions and one open-ended follow-up:

1. Is there a lot of difference between the things you talk about with Alexa and the things you want to talk about with Alexa? (y/n)
2. If so, what would you like to talk to Alexa about? (open-ended answer)
3. Would you like to talk to Alexa in a different way than you currently do? (y/n)
4. Do you/would you feel inadequate toward Alexa? (y/n)

This questionnaire also included questions on Alexa ownership, the number of Alexa devices owned and the use of other VBAs, as well as basic demographic questions for sample description purposes.

Data Analysis

The words produced in response to the free association task as well as the content of the open-ended answers were subject to an open coding and to a methodological strategy integrating content analysis (Krippendorff, 2018) and thematic analysis. We grouped short phrases, single words, and sentences into themes that were internally distinctive and consistent. The repetition of a single theme contributed to the applicability and weight of the categories identified. Four independent coders did the analysis independently. To avoid potential cultural bias, two coders were from Italy, and two were from the United States. The coders then met to discuss the results and reach a conclusion on the themed categories (Braun & Clarke, 2019). We will present the results using a narrative approach that uses (1) macro-categories for free associations and (2) excerpts from the open-ended answers. The other survey data pertinent to our RQs were analyzed using SPSS, with descriptive statistics, χ^2 tests, and standardized residuals.

Results

Perceptions of Alexa

In RQ1, we asked how respondents (US and Italian) perceive Alexa in terms of aspects including embodiment and gender. Rather than priming them with any specific constructs, we used the free association exercise to allow the spontaneous emergence of the descriptors most salient and relevant to respondents. From the US sample, we collected 846 total words, representing 290 different words. Following the omission of words or symbols that were not classifiable, the final US dictionary contained 841 words for analysis. From the Italian sample, we collected 966 total words, representing 292 different words. After the elimination of words or symbols that were not classifiable, the final Italian dictionary contained 945 words for analysis. Through content analysis, the words in the combined dictionaries were classified into seven categories: (1) Alexa identity; (2) Features, services, and functions; (3) Innovation, technology, and intelligence; (4) Dialogue; (5) Privacy; (6) Brand; and (7) Smart home. Table 2 reports the categories emerging from the free association exercise.

The frequency of these categories indicates their importance to forming the core of social representations of Alexa. The three most prominent categories, accounting for 75.1% of the total words, pertain to descriptions of who or what Alexa is (Alexa's identity), what Alexa does (Features, services, and functions), and Alexa's significance as technological innovation (Innovation, technology, and intelligence). It appears there is a halo around Alexa for many respondents, which is tied to Alexa's status as a high-tech, futuristic innovation that makes life easier. To facilitate our interpretation and description of these categories, we further divided some categories into subcategories expressing distinct themes. In the following sections, we discuss each major category.

TABLE 2 Free Associations of Alexa			
Category	**US Sample Words N (%)**	**Italian Sample Words N (%)**	**Total Words N (%)**
1. Alexa's Identity	330 (39.2%)	355 (37.6%)	685 (38.4)
2. Features, Services, and Functions	170 (20.2)	163 (17.2)	333 (18.6)
3. Innovation, Technology, and Intelligence	149 (17.7)	175 (18.5)	324 (18.1)
4. Communication	51 (6.1)	78 (8.3)	129 (7.2)
5. Privacy	80 (9.5)	48 (5.1)	128 (7.2)
6. Brand	51 (6.1)	69 (7.3)	120 (6.7)
Total	**841 (100.0)**	**945 (100.0)**	**1786 (100.0)**

Alexa's Identity

The category of *Alexa's identity* contained words describing who or what Alexa is, including Alexa's physical and social traits. Excluding a certain number of tautological words, this category is based on the specific description of Alexa as a "virtual assistant" (102 words, of which 84% come from the Italian sample) and "digital helper" (77 words, of which 76.6% come from the US sample), reflecting the content of the advertisements that frame and label Alexa as a VBA, but without perfect analogue to human roles or functions; VBA is a role that both implicitly overlaps (assistant, helper) and explicitly diverges (digital, virtual) from positions occupied by humans. Related, a number of respondents associated Alexa with other commercially-available virtual assistants (Alexa is similar to or different from X; 22 words). In terms of gender, explicitly gender-linked roles were not salient in our respondents' free associations (roles like secretary and housewife did not appear in the data). There are only 11 words (0.6% of the entire sample) that point directly to a gendered anthropomorphization of Alexa: "woman" (4), "female" (6), and "girl" (1). However, despite the absence of manifest gender references in the free associations, latent or implied connections to gender may be carried in terms like "VBA" because helper and assistant have historically been considered women's work. Alexa's identity was also described, in part, on the basis of physical traits, or how Alexa is embodied as a device. Variously, Alexa was described as round, circle, ball, design, box, little, white, blue, cylinder, support, ornament, tool, gadget, and thing (34 words). There were also positive descriptors of Alexa's physical body such as handy, portable, cool, elegant, nice, and cute (15 words).

On a consistent basis, Alexa's identity was comprised of traits with positive connotations, which accounted for nearly half of the words coded in this category. This is not surprising since the rhetoric of science and innovation has been observed to have a pro-innovation bias in which innovation is seen as always good, a road to positive progress (Godin & Vinck, 2017). Alexa was defined, more specifically, as useful (61), convenient (59), efficient, functional, and practical (49), fast (32), and easy/simple to use (25). In addition, Alexa was described as "amusing" (22 words) and "resourceful" (29). However, not all associations

about Alexa were positive. Some respondents characterized Alexa as "weird" (39), or as an evil influence leading to disturbing laziness and possible addiction (29). Several other respondents depicted Alexa as "Useless and untrustworthy" (29), or as an "immature technology" (20). Thus, in terms of identity, Alexa received more appreciation than criticism.

Features, Services, and Functions

The second-largest category was *Features, services, and functions*. Respondents evoked various activities such as setting reminders, timers, alarm clocks, agendas, and weather information, but the most prominent activity was music (157), followed by online search (43). Of minor importance (relatively low frequency) to this category of services and functions, there were several references to commands to turn the lights on or off, Alexa's connection with digital media (radio, smart TV, computer), and Alexa's e-commerce mediation role. Therefore, many associations of Alexa centered on its possible and popular uses.

Innovation, Technology, and Intelligence

In third place, respondents' words indicated that Alexa was perceived in terms of *Innovation, technology, and intelligence*. This category is composed of four subcategories: one includes "artificial intelligence" (128 words), another is based on the dimension of "advanced technology and robotics" (126), followed by two other minor subcategories, the "innovation" sphere and the world of the "digital."

Communication

The fourth-largest category emerging from the free association exercise (7.2% of all words) was *Communication*. Obviously, Alexa was not framed by the majority of respondents as a new medium of communication, although having a human voice emerged as the most important/prominent function offered by Alexa (42). Importantly, while Alexa's voice may cue anthropomorphism for some respondents, it was also referred to by other respondents as a mechanical voice, a weird voice, and in terms of voice command and voice control. In this category of communication, the mode of dialogue was the central theme, followed by interaction. The most evoked words were "conversation," "interactivity," "connectivity," "talking," "chatting," along with references to asking/answering, the sphere of company, interaction, relationships, friendships, as a bulwark against loneliness (69), and finally the opening greetings (e.g., "Hey, Alexa") (21), fundamental in any dialogue.

Privacy

The fifth-largest category was *Privacy*. Although the topic of privacy is a concern for many people, for the current study only 7.2% of the words produced from the free association exercise were about privacy issues. In these cases, Alexa was clearly perceived as something or somebody who is intrusive, invasive, always listening (46), and even spying (41). This intrusion into everyday life is evoked as coming also from the government (e.g., "Big brother") (21). Alexa was imagined as a danger to people's privacy, a tool of continuous surveillance. For the US sample, 9.5% of the dictionary was concerned with privacy while only 5.1% of the Italian sample commented on privacy issues.

Brand

The sixth category refers to the *Brand* of Alexa. Alexa's specific identity is heavily conditioned by the power of corporate brands—especially by Amazon, but also by other technology firms (e.g., Google and Apple)—and several respondents listed the name of one or more companies in the free association exercise (120 words). Brand associations reflect the efforts of global capitalists to fix the identity of Alexa and other social robotic technologies in a commodification framework.

Smart Home

The last and smallest category was *Smart home* (3.8% of the entire dictionary). This category was comprised of terms associating Alexa with the home, home automation, the Internet of Things (IoT), and family. Alexa was contextualized within the house, or the smart home, where Alexa is tasked to change the home environment according to the user's desires. It is worth noticing that 85.1% of the words connected to this category came from the Italian sample.

Cross-Cultural and Gender Comparisons

From a cross-cultural comparison, US respondents attributed more positive traits to Alexa than did the Italian respondents, but they were also more concerned with privacy. By contrast, Italian respondents perceived Alexa more in terms of identity (who or what Alexa is and Alexa's physical and social traits) and as a tool that enables artisanal home automation involving smart home applications, IoT, and integrative automation. Regarding gender, women in both national samples generated a richer linguistic production than men (61.0% vs. 39.0% of the entire dictionary), driven by the fact that there were more women than men respondents. Especially in the US sample, the words evoked by men comprised only 31.1% of the overall dictionary (versus 45.6% of the words in the Italian dictionary). In both samples, words generated by women were more numerous in all categories except *Smart home*, where Italian men contributed a greater number of references.

Expectations of Alexa

In RQ2, we asked what expectations respondents (US and Italian) have of Alexa. To identify what people expect (or would expect) from Alexa in terms of being able to fulfill their requests, we collected 637 open-ended answers from 97.3% of the overall sample. Considering that only 241 respondents (36.8%) reported personal ownership of Alexa, those respondents who did not own Alexa also answered this question. The first four categories were constructed to reflect expectation levels (ranging from lower to higher) that respondents hold for Alexa, while the fifth and the sixth categories reflect respondents' specific expectations. These expectations are reported in Table 3.

TABLE 3 Expectations from Alexa

Category	US Sample N (%)	Italian Sample N(%)	Total Words N (%)
1. No expectations	13 (4.0%)	48 (15.3%)	61 (9.6%)
2. Expecting that Alexa does what Alexa should do or at least a good deal of	201 (62.2%)	50 (15.9%)	251 (39.4%)
3. Expecting a little better performance	56 (17.3%)	103 (32.8%)	159 (25.0%)
4. Expecting smooth or great performances	28 (8.7%)	76 (24.2%)	104 (16.3%)
5. Expectations formulated on the basis of a comparison with other virtual assistants	17 (5.3%)	8 (2.5%)	25 (3.9%)
6. Expectations of Alexa's integration and compatibility with the other domestic digital devices	8 (2.5%)	29 (9.2%)	37 (5.8)
Total	**323 (100.0)**	**314 (100.0)**	**637 (100.0)**

No (or Very Low) Expectations

In the first category of *No (or very low) expectations* (61; 9.5%), comments indicated that respondents expected almost nothing at all from Alexa. For example, "Honestly nothing, I stopped using it and I gave it to my mother because it has no better functions than my phone" (Italian, Woman). A number of respondents expected this virtual assistant to fail or to have extremely low performance or functions, which was reflected in phrases such as "not much," "only for . . ., " "just for . . ., " "nothing except . . ., " or generally, they expected to not be able to rely on Alexa for much (e.g., just for music). "Alexa like all other voice assistants understand a tenth of what you ask him; for example, sometimes when I ask him to set a light to a percentage and most of the time he doesn't understand," said an Italian man. This group of 61 respondents (9.6% of the sample) used language (Alexa is only a machine, a search engine, an AI, a computer) to minimize what Alexa is expected to do. "I don't expect much . . . whatever Alexa does I can do it too by typing in my smartphone instead of yelling at Alexa" wrote an Italian woman. Therefore, some respondents expressed extremely low expectations of Alexa based on their assessments of Alexa's limitations.

Expecting That Alexa Does What Alexa Should Do

The second category of *Expecting that Alexa does what Alexa should do* (or at least a good deal of it) was also the largest (251, 39.4%). In this category, respondents discussed their expectations that Alexa's actual performances deliver on what Amazon has promised the VBA can do. For example, "I'm fine with it already as it is," wrote an Italian woman. A US woman said, "Just to be able to do as I ask her to do, as to play music or tell me the weather." In the words of a US man: "For the most part I use it for music and timers so I get what I need from it." However, for some respondents, there was a gap between their expectations

and Alexa's performance which led to irritation with the device. "I expect her to fulfill basic requests like 'lights on/off,' 'play music,' etc. but I have stopped asking her questions because she often doesn't understand them," explained one US man. Similarly, a US woman wrote that Alexa "Sometimes can be frustrating because I'll be trying to say something to her and she isn't listening."

In this category, respondents sometimes stressed that Alexa does not work all the time as one would expect, instead functioning properly "most of the time," "usually," "normally," "almost always," "not entirely," "most all," or a certain percentage of the time. They qualified the number of things Alexa is expected to do. A respondent said, for example, "I expect Alexa to fulfill many, if not all, of my requests. I would expect Alexa to understand me and be able to report back to me the information that I am seeking" (US, Man). An Italian woman expressed what she expects of Alexa as "Not much, she can only do what she is programmed to do, so, in practice, I can decide to what extent to give her the freedom of action; I choose its limits." Thus, this category reflected a prominent expectation that Alexa should perform as advertised and the resulting frustration which arises when this is not the case.

Expecting a Better Performance

Comments included in the third category of *Expecting a better performance* (159; 25.0%) indicated that respondents expected Alexa to fulfill basic functions as advertised/designed but also wanted Alexa to be able to do more than current capabilities. They expressed the desire for Alexa to have greater reliability in assisting them with daily life. In particular, the dominant themes in this category related to the improvement of the services that Alexa already provides, such as music, weather, the agenda, the calendar, and the alarm clocks. "I expect Alexa to be able to fully comprehend and fulfill the task that is given," said a US man. A service that Alexa already offers but which respondents singled out for improvement was information search: "More or less what it is already capable of doing. Perhaps it would be better if it had more answers to questions of general knowledge instead of giving the classic answer: I'm sorry, I don't understand" (Italian, Man). Other wishes concerned possible new applications or capabilities for Alexa such as "that she is able to help in case of difficulties such as calling 118 or giving useful information on where a particular building is . . . " (Italian, Woman) or to "Play the weekend League for me" (Italian, Man).

A strong hope of respondents was for an improvement in Alexa's ability to mimic human interpersonal communication: "I would expect her to always listen to me" (Italian, Woman); "It should keep company like a living being without the fear, however, that his conversations will be recorded and sold to companies" (Italian, Man); "Knowing how to sustain a dialogue that is likely to be human" (Italian, Man); "The ability to answer any of my doubts" (Italian, Man); and, "That she knows how to interpret different questions and requests even if they are posed in a slightly different way from the normal/well-defined syntax" (Italian, Man).

In general, responses in this category expressed an expectation that Alexa is able to help them simplify, facilitate, organize, and manage their day-to-day. There was also a strong theme of the desire to speed up Alexa's performance expressed by affixing to their expectations adverbs and adjectives like "quickly," "efficiently," "fully," "always," "concisely," "fast," "accurate," "in the best way possible," "with no troubles," and "easily." Respondents emphasized the hope for greater speed, accuracy, and efficiency in the execution of the commands

and services Alexa performs, including the control of various domestic technologies, as well as the desire for Alexa to be more programmable in a personalized way. The comments classified in this category offer a series of indications for Amazon on how to reshape Alexa for the future; it represents a window on the potential co-construction with users of this virtual assistant.

Expecting Smooth or Great Performance

The fourth category *Expecting Smooth or Great Performance* (104; 16.32%) included comments insisting Alexa should perform functions fully and flawlessly. Within these comments, there was no indication of respondents' dissatisfaction with Alexa's performance or acknowledgment of limitations. The expectations expressed could be unrealistically high, with zero margins of error. Consider, for example: "Having everything at hand" (Italian, Woman); "I expect Alexa to do everything she does to fulfill my requests. I can ask her questions to figure out a random fact, I can check my Amazon updates, and I can also communicate with other Alexa devices" (US, Woman); "I would expect the solution to every request (e.g., turn on the stove)" (Italian, Woman); and "That is able to adapt according to my needs" (Italian, Man). Hence, some respondents had lofty expectations of Alexa and anticipated that Alexa could live up to them.

Expectations Based on a Comparison With Other Virtual Assistants

Whereas the first four categories represented levels of respondents' expectations ranging from very low to high, the final two categories encapsulated sentiments specific to exactly what Alexa is expected to do rather than the acceptability of Alexa's performances. The fifth category of *Expectations based on a comparison with other virtual assistants* (25; 3.92%) included comments that calibrated expectations toward Alexa on the basis of prior experience with and knowledge of other VBAs as well as other digital devices such as mobile phones, computers, and even radios. The digital world in which Alexa arrived was already rich in opportunities and alternatives, so it is perhaps unsurprising that several respondents compared the various devices with each other, to see which can do what best. For instance, they expected Alexa to be "able to respond like a search engine, just without having to type" (Italian, Woman) or to be similar to "How to use Google, but speaking" (Italian, Woman).

Expectations of Alexa's Integration and Compatibility With the Other Domestic Digital Devices

This last category (37; 5.81%) included comments such as "Able to control the electronic components of the house without too many complex configurations," as expressed by an Italian man. Another wrote, "I expect it to be able to properly control all my Wi-Fi devices even in an automatic/programmed way." In the words of an Italian woman, Alexa was expected to perform "Integration and voice control of the house (oven, washing machine, heating, lights, etc.), create/remember events in the calendar, alarms, control the playback of music and multimedia content on other devices, information on the weather, help with recipes in the kitchen." In a similar vein, a US woman expressed the expectation of Alexa "To control devices around my house like lights, music, TV, and just be able to activate any system in my house." Finally, an Italian man expected Alexa to "Independently learn the

user's habits in the use of available technology (PC, TV, audio, lights, security, smartphone, travel, car) and anticipate the user's actions with a simple verbal command."

Cross-Cultural and Gender Comparisons

When exploring how US and Italian respondents structured their expectations it emerged that there were significant differences ($\chi_5^2 = 162.03$, $p < .0001$): Italians were significantly more likely than US respondents to have no or very low expectations of Alexa (Std. Res = 4.8), while US respondents were more likely than Italians to frame expectations in terms of alignment between Alexa's advertised and actual performances (Std. Res = 12.0). Further, more Italian than US respondents expected better or even great performances from Alexa (Std. Res = 4.5 and 5.3) and especially better integration and compatibility with other household electronic devices and domestic appliances (Std. Res = 3.6). As to gender, while there were no significant differences between US women and men in their expectations toward Alexa ($\chi_5^2 = 7.39$, *ns*); in the Italian sample this relation was significant ($\chi_5^2 = 12.40$, $p < .04$) but no single cell (specific category analysis) showed a significant relationship.

Desires of Alexa

In RQ3, we asked what users (US and Italian) would ideally like to be able to talk about with Alexa. We began by investigating whether users reported a gap (or "a lot of difference") between the things they talked about with Alexa and the things they *wanted* to talk about with Alexa. A minority ($n = 41$; 17.2%) affirmed experiencing a gap between their actual and desired topics of conversation with Alexa, whereas the majority ($n = 198$; 82.8%) indicated correspondence between the topics addressed with Alexa and those they would like to address. No cultural ($\chi_1^2 = .149$, *ns*) or gender differences emerged regarding the prevalence of this gap or alignment (for the US sample, $\chi_1^2 = .127$, *ns*; for the Italian sample, $\chi_1^2 = .007$, *ns*).

We also employed slightly different phrasing to explore whether respondents had the desire to talk to Alexa "differently than they currently do" and observed percentages of answers similar to those above: Only 25.3% ($n = 61$) expressed the desire to speak differently with Alexa. As to country, Italians were significantly more likely than US participants to express the desire for difference ($\chi_1^2 = 25.51$, $p < .0001$; 45.1% vs. 15.2%; Std. Res = 5.1). In terms of gender, there were no significant differences between men and women in either the US sample ($\chi_1^2 = 1.61$, *ns*) or in the Italian one ($\chi_1^2 = 1.67$, *ns*).

Crossing these two questions revealed that the few respondents ($n = 22$) who indicated a gap were significantly more likely than those who did not to express the desire to talk to Alexa differently than they currently do ($\chi_1^2 = 20.61$, $p < .0001$, Std. Res = 4.5). We explored further to determine whether there was an association between felt gaps and respondents' feelings of inadequacy toward Alexa, but the two were unrelated ($\chi_1^2 = .83$, *ns*). The respondents who wished they could talk to Alexa differently were asked what they would like to talk about. Using thematic analysis, we processed the open-ended answers of 51 US and 13 Italian respondents. Several respondents wrote about their desire to have a normal conversation with Alexa:

- "Well, I wish she was more intelligent so I could converse and have a whole interaction with her. Sort of like how Tony talks to Jarvis in *Iron Man*" (US, Man).
- "I would like to have an actual conversation where we go back and forth on a topic. Discussing, sharing opinions, branching into stories related to the topic, and overall building a complicated conversation. People aren't always around to talk to, Alexa is" (US, Man).
- "If Alexa could have a conversation, I would talk to her about anything really" (US, Woman).
- "Anything, I would keep it a bit as a diary and as a person to confront" (Italian, Woman).
- "I would like answers that are more specific and similar to the human way of thinking" (Italian, Man).

Others specified that they would simply like to have a conversation on topics of everyday life, such as "My day" (US, Woman), "Random things that may be happening in my life" (US, Woman), and "I would appreciate if she had a wider knowledge of real-world topics" (US, Woman).

Another group of respondents expressed the desire to discuss both personal and emotional issues (e.g., what some US and Italian women described as "sentimental problems"). Others wanted to be able to talk about culture, news, or gossip. For instance, one US woman said, "I would like to talk about music and pop culture" and another wrote, "I would probably talk about current events or my favorite TV shows with Alexa." Several other US women reported wanting to talk to Alexa about "actual issues happening in the world" or "I would use her for just information." One Italian woman said she would like to talk about "a bit of everything, especially frivolous entertainment (e.g., gossip)."

Some respondents wanted to engage in deep or profound discussions with Alexa. For example, both Italian and US women wanted to talk about "human life issues." Or, as two different US women stated, "It would be cool to talk about more complex things" and "I would like to be able to ask more in-depth questions and have them answered." Men commented on this aspect as well. An Italian man said, "It would be fun if it reached the levels of 'Jarvis'" (the famous artificial intelligence from the movie *Iron Man*). Another Italian man said that he wished he "could create more complex routines that can perform more elaborate actions." Another respondent noted that he would "like to talk to her [Alexa] about ethics and morality and the human experience" (US, Man). Finally, some users said they would like to talk about "its features, how it was designed and built" (Italian, Man). Others expressed the desire to seek advice from Alexa, "About things like what would be considered appropriate during different situations. For example, asking her what is appropriate to bring and wear to an interview, on a date, etc." (US, Woman). In general, Italians more than US users expressed a desire for improvement at the level of communication.

Discussion

Using a cross-cultural analysis of US and Italian respondents, the purpose of this study was to examine how people perceived Alexa's image and gender, what they expected from Alexa, and how they would like their communication with Alexa to be. The free association exercise offered a series of interesting insights. In the social representations of Alexa that emerged from this data, the first macro category of meaning (38.4% of the entire dictionary) was constituted by Alexa's identity. The robotic-self, as Straub et al. (2010) argued, is articulated in the professional role (artificial assistant/digital helper) but delinked from the roles and functions of the analogue world such as the secretary and the housewife, since these two words were never mentioned by respondents. In general, respondents were satisfied with Alexa as a device. Alexa presents a ludic aspect in common with other forms of digital media (Frissen et al., 2015). This is a novelty in respect to the two recognized emotional approaches to robots: (1) the fear that robots become our competitors and gain superiority or (2) the tendency to treat robots as humans (Horstmann & Krämer, 2020). In the present study, only four respondents used the word "scary" to convey their impression of Alexa. What is more salient in the current data instead is the fear that Amazon uses Alexa to violate users' *Privacy,* which is the fifth category (127 words collected on this topic, equal to 7.1% of the entire dictionary).

In contrast with other studies on social robots documenting that their physical body was not salient (Fortunati et al., 2021; Fortunati, Manganelli, et al., 2022), some limited reference to Alexa's body appeared in the current study (2.7% of the entire dictionary). This finding may emerge from Alexa's minimal embodiment and from the fact that, while many social robots are still prototypes and people have limited direct experience, people have opportunities for firsthand interaction and observation of VBAs like Alexa. Gender was even less salient (0.6%) than the physical body in free associations about Alexa. Although Alexa presents powerful cues of gendering as a feminine persona (voice, personality, and behaviors) (Fortunati, Edwards, et al., 2022; see also Humphry & Chesher, 2021; Woods, 2018), in open-ended answers, respondents have elaborated a largely disembodied and therefore ungendered (or only implicitly gendered) image of Alexa. Although the impression of something lies in a pre-cognitive dimension, it is essential to explore it since it "often shapes our final appraisal of that object" (de Graaf & Allouch, 2017, p. 28). These findings, which are in line with the studies carried out by Fortunati et al. (2021) and Fortunati, Manganelli, et al. (2022) cited above, seem to point mainly to the digital world in which Alexa lives, while, for example, Etzrodt and Engesser (2021) found that VBAs were conceptualized as "personified things." However, Etzrodt and Engesser's findings and the current study may be the result of an artifact of methodology. Their findings came from a survey that asked explicitly about identity classification, while the present study employed free associations, a semi projective exercise that reveals the latent and implicit dimensions of the object of study (in this case, Alexa's image). In fact, when requested to assign a gender from a list to Alexa (male, female, neutral, or in a different way), most respondents in the current selected "female," even though they rarely used corresponding feminine pronouns in subsequent writing about Alexa (see Fortunati, Edwards, et al., 2022, for full consideration of explicit gender labeling and linguistic practices).

In the context of Alexa, factors such as age, ethnicity, and nationality were not salient at all in spontaneous word associations. Interpreted in light of Social Identity Theory (SIT) (Tajfel, 1978), these findings suggest that respondents perceived Alexa as a quasi-in-group member, an entity that is para-affiliated to the larger group of humans. C. Edwards et al. (2019) demonstrated that SIT could be used to understand individuals' perceptions of VBAs. We argue that these findings point to a process of social identification with this VBA, which is at an early stage of definition and presents the need to build a Parasocial Identity Theory for the robotic-self. If users of Alexa have some level of identification (quasi-in-group status) with the VBA, it is more likely that the flow of messages will be natural and lead to potential positive communication outcomes (e.g., attraction, credibility), given the constraints of the technology. In other words, users will be able to interact with the VBA in a human-like way without a steep learning curve or the strong need to establish identification beyond human conversational norms. This notion is important because designers can focus on the message tasks and flow of conversations of VBAs and not as much on creating identification to produce in-group status. Future research will test these ideas of parasocial identities of machine actors.

Coming back to user perceptions of Alexa, the second category, *Features, services, and functions,* comprised 18.6% of the free association exercise. As often happens with technological artifacts, Alexa is conceptualized by the functions and services that define Alexa's purpose and uses. The category termed *Innovation, technology, and intelligence* accounted for 18.1% of the words in the dictionary. These respondents characterized Alexa as a positive development within the world of innovation and advanced technology. Respondents did not consider Alexa as a mere gadget but as the outcome of the most innovative high-tech industry, with one foot in the future. Respondents did not report any hybridization or uncertain boundaries between Alexa and humans, although an increasing amount of scientific literature reflects the blurring boundaries between humans and machines (Etzrodt & Engesser, 2021; Weidmüller, 2022). Decidedly, these first three categories accounted for 75.1% of the words that form the core of the social representations of Alexa. It is interesting to point out that *Communication,* the fourth category, contained only 7.2% of the respondents' words, indicating that Alexa is not perceived mainly as a proper medium of communication or that possibility has not yet been fully realized. To answer the first research question, Alexa's image is elaborated as scarcely embodied and ungendered. Instead, respondents tended to associate Alexa with a distinct category of being—the VBA, virtual assistant, or digital helper—with which one talks, and to conjure praise or less commonly concern for certain technical capabilities.

Regarding RQ2, our exploration of respondents' expectations toward Alexa echoed the appreciation that the majority of them expressed toward the device in the free association task. Only about 20% of respondents across the sample identified a gap between expectations and actual performance. The expectations-reality gap is often troublesome when people meet actual robots in everyday life because they lack critical elements of understanding social behavior, such as "natural" language processing (NLP) and activity recognition (Sharkey & Sharkey, 2010). This study showed that most people appreciate these virtual assistants and that the experience gap was not as applicable with VBAs as it might be with embodied

social robots. Our findings resonate with de Graaf's and Allouch's (2017) research, which showed the positive effects of users' high prior expectations on their intentions to consider the robotic dinosaur Pleo as a companion. Quite possibly, the lack of human-like social cues (or the presence of animal-like cues) for Pleo and the lack of embodiment of Alexa might foster a reduced gap between expectations and experiences.

Notably, a fifth of respondents talked about issues of communicating with Alexa. Respondents commented on the need to repeat the same question or command many times and the rigidity of the language that must be used for Alexa to understand, outside of which Alexa is unable to understand anything. Alexa allows these respondents to discover the many differences between human and machine language practices. Furthermore, these respondents focused on automation occurring only at the textual level, while human language counts on many other variables that complement it, such as non-verbal communication, proxemics, haptics, and so forth. Because of the lack of these different cues, it is not surprising that the main requests of these respondents were for Alexa to show a greater, immediate understanding of the questions asked, even when they are of a complex nature, and to have a better understanding of "natural" language and voice recognition.

Our third research question explored users' desires of Alexa's communication capabilities. In short, people's main desire was to have a normal conversation with Alexa, in which they could talk about anything and everything without limitations. In the case of Alexa, we are far from a reality in which each user is able to "remodel" the technological artifact as a personal, conversational partner. Perhaps, as more innovations are developed by technology firms and sometimes users, depending on temporal, spatial, and sociocultural contexts (Fortunati, 2014), Alexa will grow in this capability.

Cutting through all three research questions, we examined the cross-cultural comparisons of the United States/Italy and gender. Country and gender produced some differences in respondents' answers regarding Alexa's social representations, expectations, and desires toward this VBA. Still, the country mattered more than gender for the current study. Starting from the country and Alexa's image, the US respondents attributed more positive traits to Alexa compared to Italian respondents but were also more concerned about privacy. This finding is not surprising since the US cultural emphasis placed on individual rights and freedoms as well on one's inviolate personality (focus on individualism) and desires for disclosure control may lead to greater worry about governmental and corporate surveillance and intrusion into the personal sphere (Horowitz, 2006; Richards & Solove, 2007). On the contrary, Italians perceived Alexa more in terms of identity and as a tool that facilitates artisanal home automation involving smart home applications, IoT, and integrative automation. As to expectations, country matters as well. US respondents more than Italians held firm to the idea that Alexa should do what is advertised, while more Italians expected better or even great performances from Alexa. This is especially true regarding better integration and compatibility of Alexa with the other electronic devices and domestic appliances in the house. Concerning desires, Italians expressed a greater desire for significant improvement in Alexa's communication abilities. In sum, there is a fundamental summarizing cultural difference between these US and Italian respondents: US participants focused more on what Alexa is today and on the claim that Alexa's capabilities match those promised at the time of the purchase. At the same time, Italians used Alexa as a springboard to look to the future of technological innovation.

Regarding gender and Alexa's social representations, it is important to note that women are overrepresented in both national samples. Especially in the US sample, the words evoked by men comprised only 31.1% of the overall dictionary (compared to 45.6% in the Italian sample). For both samples, the words provided by women respondents were more numerous in all the categories except *Smart home* (which was overrepresented by Italian men). Not surprisingly, early adopters of the technologies connected to smart homes seemed more likely to be men than women, as is the case for other digital technologies. As for expectations, there was a very weak gender difference. Finally, regarding desires for communication with Alexa, Italian men were more likely than Italian women to want significant improvements.

Limitations of the Study

The current findings are significant because they express people's experience with Alexa at a cross-cultural level and with an open-ended response technique. These findings, however, carry some limitations that need to be addressed. First, we used convenience samples of university students, and thus findings should be taken lightly concerning generalizing these results. While they present preliminary proof-of-concept regarding the importance of nation/culture/country to user perceptions of Alexa, future studies should examine a more diverse population of users. Second, all the measures in the study are self-reported and thus may be affected by issues of social desirability. As to the future paths of the research, we believe that it might be helpful to follow up on this line of work with another study targeting some of the most interesting new questions with different methods.

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